CLAIMS

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An NF-KB inhibitor comprising as an active ingredient à benzoquinone derivative represented by the following general formula (1):

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$$\begin{array}{c|c}
R_1 & R_3 \\
R_2 & CH_2-Z-(CH_2)_n-R_4
\end{array}$$
(I)

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wherein

 R_1 , R_2 , and R_3 are each independently a hydrogen atom, an alkyl group\having 1 to 5 carbons, or an alkoxy group having 1 to 5 carbons;

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R4 is a hydrogen atom, a hydroxymethyl group, an alkyl group, or a caxboxyl group which is optionally esterified or amidated;

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Z is

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CH=CH-CH=CH

and, n is an integer from 0 to 6, or its hydroquinone form, or a pharmaceutically acceptable salt thereof.

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The NE-KB inhibitor according to claim 1 in wherein which R_1 and R_2 are a hydrogen atom, a methyl group, or a methoxy group.

The NF-KB inhibitor according to claim 1 or 2 3. wherein

n which R, is a hydrogen atom or a methyl group.

Consposition

4. The NF-KB inhibitor according to claim 1, 2, or

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CH=CH-

and n is an integer 0.

Composition

5. The NF-KB inhibitor according to claim 1, 2, or wherein

A in which Z is

and n is an integer 1, 2, or 3.

6. The NF-kB inhibitor according to any one of wherein claims 1 to 5 in which R_4 is a group $-COOR_5$ wherein R_5 is a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted phenyl group, or an optionally substituted aralkyl group having 7 to 11 carbons.

- The NF-KB inhibitor according to any one of wherein claims 1 to 5 in which R4 is a group -CONR6R7 wherein R6 and R7 are each independently a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted bicyclic unsaturated or partially saturated hydrocarbon ring group having 9 to 11 carbons, an optionally substituted heterocyclic group, an optionally substituted phenyl group, an optionally substituted aralkyl group having 7 to 11 carbons, or a heteroaryl-C1-C3-alkyl group, or R6 and R7, together with the nitrogen atom to which they are attached, represent a heterocyclic group which may further contain a nitrogen, oxygen, and/or sulfur atom.
- 8. The NF- κ B inhibitor according to any one of wherein claims 1 to 5 in which R_4 is a group -CONR₆R₇ wherein R_6 and R_7 , together with the nitrogen atom to which they are attached, represent a 5- to 10-membered optionally

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substituted, nitrogen-containing heterocyclic group which may contain, in addition to the carbon and nitrogen atom, 1 to 3\heteroatoms selected from the group consisting of a nitrogen, oxygen and sulfur atom, the carbon atom on said cyclic group being optionally a ketone form or the sulfur atom on said cyclic group being optionally an oxide form. Composition

The NF-KB inhibitor according to claim 1, 6, 7, which R₁ and R₂ are a methyl group or a methoxy group; R3 is a methyl group: R4 is a carboxyl group which is optionally esterified or amidated; Z is

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and n is an integer 1,

The NF-KB inhibitor according to any-one wherein the suppressing agent for the gene expression of one or more substances selected from the group consisting of IL-1, TN ξ - α , IL-2, IL-6, IL-8, iNOS, granulocyte colony-stimulating factor, interferon-β, ICAM-1, VCAM-1, ELAM-1, major histocompatibility system class I, major histocompatibility system class II, $\beta 2$ microglobulin, immunoglobulin light chain, serum amyloid A, angiotensinogen, complement B, complement C4, c-myc, HIV, HTLV-1, SV40, CMV, and adenovirus.

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Compastion

The NF-KB inhibitor according to any one of claims 1 to 9 which is a preventive or therapeutic agent for inflammatory diseases. Compositi

12. The NF-κB inhibitor according\to any. claims 1 to-9 which is a preventive or therapeutic agent for autoimmune diseases. Composition

The NF-KB inhibitor to any one of claims 1 to 9 which is a preventive or therapeutic agent for viral diseases.

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14. A preventive or therapeutic agent for diseases caused by the activation of NF-kB comprising as an active ingredient a benzoquinone derivative represented by the following general formula (1):

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$$\begin{array}{c|c}
R_1 & & \\
R_2 & & \\
CH_2-Z-(CH_2)_n-R_4
\end{array}$$
(I)

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15

wherein

 R_1 , R_2 , and R_3 are each independently a hydrogen atom, an alkyl group having 1 to 5 carbons, or an alkoxy group having 1 to 5 carbons;

 R_4 is a hydrogen atom, a hydroxymethyl group, an alkyl group, or a carboxyl group which is optionally esterified or amidated;

Z is

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CH=CI

and, n is an integer from 0 to 6, or its hydroquinone form, or a pharmaceutically acceptable salt thereof.

15. A novel compound selected from:

N-[3-[4-(5-6-dimethoxy-3-methyl-1,4-

benzoquinon-2-ylmethyl)phenyl]propionyl]morpholine,

N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-

benzoquinon-2-ylmethyl)phenyl]propionyl]thiomorpholine Soxide,

N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-

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benzoquinon-2-ylmethyl)phenyl]propionyl]thiomorpholine S-
      dioxide,
                 N = [3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-\(\frac{2}{2}\)-ylmethyl)phenyl]propionyl]piperidine,
                 N = \{3 - [4 - (5, 6 - dimethoxy - 3 - methyl - 1, 4 - 4 - 4]\}
      benzoquinon-2-ylmethyl)phenyl]propionyl]dimethylamine,
                 N-[3-]4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]isopropylamine,
                 N-[3-[4](5,6-dimethoxy-3-methyl-1,4-
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      benzoquinon-2-ylmethyl)phenyl]propionyl]ethanolamine,
                 N-[3-[4-(5), 6-dimethoxy-3-methyl-1, 4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]benzylamine,
                 N-[3-[4-(5,6]]dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]phenethylamine,
15
                 N-[3-[4-(5,6-d]] methoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]morpholine,
                 N-[3-[4-(5,6-dim + thoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]thiomorpholine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl acryloyl piperidine,
20
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]dimethylamine,
                 N-[3-[4-(5,6-dimethoxy+3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]isopropylamine,
                 N-[3-[4-(5,6-dimethoxy-3+methyl-1,4-
25
      benzoquinon-2-ylmethyl)phenyl]acryl\varphyl]ethanolamine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloy|| benzylamine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
30
      benzoquinon-2-ylmethyl)phenyl]acryloyl]phenethylamine,
                 N-[3-[3-(5,6-dimethoxy-3-methy]]-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]piperidine,
                 N-[3-[3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]thiomorpholine,
35
                 N-[3-[3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]morpholine,
                 N-[3-[3-(5,6-dimethoxy-3-methyl-1,4-
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benzoquinon-2-ylmethyl)phenyl]propionyl]isopropylamine,

```
3-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]acrylic acid,
                N-(3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2\ylmethyl)phenyl]acryloyl]piperidine,
                N-[3 \setminus [3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]morpholine,
                N-[3-[3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]acryloyl]isopropylamine,
10
                N-[3-[3-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethxl)phenyl]acryloyl]thiomorpholine,
                N-[3-[4-(3,3],6-trimethyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]propionyl]isopropylamine,
                N-[3-[4-(3,5,6]]trimethyl-1,4-benzoquinon-2-
15
      ylmethyl)phenyl]propionyl\piperidine,
                N-[3-[4-(3,5,6-t]] imethyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]propionyl]morpholine,
                N-[3-[3-(3,5,6-trimethyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]propionyl]isopropylamine,
20
                N-[3-[3-(3,5,6-trimethyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]propionyl]piperidine,
                 3-[2-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-methyl-1]
      ylmethyl)phenyl]acrylic acid,
                N-[3-[2-(5,6-dimethoxy-3+methyl-1,4-
25
      benzoquinon-2-ylmethyl)phenyl]acryloyl]thiomorpholine,
                 3-[2-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
      ylmethyl)phenyl]propionic acid,
                N-[3-[2-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl\piperidine,
30
                N-[3-[2-(5,6-dimethoxy-3-methy]-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]morpholine,
                N-[3-[2-(5,6-dimethoxy-3-methyl]],4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]thiomorpholine,
                N-[3-[2-(5,6-dimethoxy-3-methyl-1]]4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]isopkopylamine,
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N-[3-[4-(5,6-dimethoxy-3-methyl-1,4]]

benzoquinon-2-ylmethyl)phenyl]propionyl]-(s)-2

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(methoxymethyl)pyrrolidine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon \2-ylmethyl) phenyl ] propionyl ] isonipecotamide,
                 N = \sqrt{3 - [4 - (5, 6 - dimethoxy - 3 - methyl - 1, 4 -
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-
      methylpiperidine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-2-
      methylpiperidine,
10
                 N-[3-[4-(5), 6-dimethoxy-3-methyl-1, 4-
      benzoquinon-2-ylmethy 1) phenyl ]propionyl ]-3-
      methylpiperidine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-
15
      methoxyaniline,
                 N-[3-[4-(5,6-dime)] thoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-2-
      hydroxyaniline,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
20
      benzoquinon-2-ylmethyl)phenyl]propionyl]-3,4-
      dimethoxyaniline,
                 N-[3-[4-(5,6-dimethoxy-\S-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-D,L-alaninol,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propiohyl]-D,L-pipecolic
25
      acid ethylester,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl\-L-prolinamide,
                 4-[3-[4-(5,6-dimethoxy-3-methy]-1,4-
30
      benzoquinon-2-ylmethyl)phenyl[propionyl]
      aminophenylacetonitrile,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1],4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-pentylaniline,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4]]
35
      benzoquinon-2-ylmethyl)phenyl]propionyl]-(s)-(-)-1-
      phenylethylamine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
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benzoquinon-2-ylmethyl)phenyl]propionyl]-(R)-(+)-1-
      phenylethylamine,
                N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-1,3-
      dimethylbutylamine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-\(\chi\) [phenyl] propionyl] cycloheptylamine,
                 N-[3-(4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-3,5-
10
      dimethylpiperidinė,
                 1-[3-[4-\sqrt{5},6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-
      ethoxycarbonylpiperazine,
                 1-[3-[4-(5,6]]dimethoxy-3-methyl-1,4-
15
      benzoquinon-2-ylmethyl) henyl]propionyl]-4-
      phenylpiperazine,
                 1-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-hydroxy-4-
      phenylpiperidine,
20
                 1-[3-[4-(5,6-dimeth) xy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-(4-
      chlorophenyl)-4-hydroxypiperidine,
                 1-[3-[4-(5,6-dimethoxy + 3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-4-(2-
25
      methoxyphenyl)piperazine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-6,7-dimethoxy-
      1,2,3,4-tetrahydroisoquinoline,
                 4-acetyl-4-phenyl-1-[3-[4-(5)6-dimethoxy-3-
30
      methyl-1,4-benzoquinon-2-ylmethyl)phenyl]propionyl]
      piperidine,
                 N-[3-[4-(5,6-dimethoxy-3-methy]] 1,4-
      benzoquinon-2-ylmethyl)phenyl]propionyl]-1\lambda2,3,4-
      tetrahydroisoquinoline,
35
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4]
      benzoquinon-2-ylmethyl)phenyl]propionyl]isoamylamine,
                 N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
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benz@quinon-2-ylmethyl)phenyl]propionyl]cyclohexylamine,
                                                             N-[3-[4-(5,6-dimethoxy-3-methyl-1,4-
                       benzoquinon-2-ylmethyl)phenyl]propionyl]-4-
                       hydroxya\niline,
                                                             4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)benzoic acid,
                                                              N_{-}[4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)benzoyl]morpholine,
                                                             N-[\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\ti}
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                       ylmethyl)benzoxl]isopropylamine,
                                                             N-[4-\5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)benzoyl)piperidine,
                                                             N-[4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)benzoyl]th\iomorpholine,
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                                                              3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)benzoic acid
                                                              N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon-2-methyl-1,4-benzoquinon
                       ylmethyl)benzoyl]isopropylamine,
                                                             N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
20
                       ylmethyl)piperidine,
                                                             N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)morpholine,
                                                             N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)thiomorpholine,
25
                                                              4-[4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                       ylmethyl)phenyl]-n-butyric acid,
                                                             N-[4-[4-(5,6-dimethoxy-3]methyl-1,4-
                        benzoquinon-2-ylmethyl)phenyl]butandyl]morpholine,
                                                             N-[4-[4-(5,6-dimethoxy-3-mathyl-1,4-
30
                       benzoquinon-2-ylmethyl)phenyl]butanoyl\]thiomorpholine,
                                                              N-[4-[4-(5,6-dimethoxy-3-meth]y]-1,4-
                        benzoquinon-2-ylmethyl)phenyl]butanoyl]piperidine,
                                                             N-[4-[4-(5,6-dimethoxy-3-methyl-1,4-
                        benzoquinon-2-ylmethyl)phenyl]butanoyl]isopropylamine,
35
                                                              4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-
                        ylmethyl)phenylacetic acid,
                                                              N-[4-(5,6-dimethoxy-3-methyl-1,4-behzoquinon-2-
```

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ylmethyl)phenylacetyl]morpholine,

N-[4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]piperidine,

N-[4-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]thiomorpholine,

ylmethyl)phenylacetyl]isopropylamine,

3-\(\frac{5}{6}\), 6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetic acid,

N-[3-\5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]piperidine,

N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]thiomorpholine,

N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]morpholine,

N-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenylacetyl]morpholine,

4-[3-(5,6-dimethoxy-3-methyl-1,4-benzoquinon-2-ylmethyl)phenyl]-n-butyric acid,

 $N-[4-[3-(5,6-dimeth)] \times y-3-methyl-1,4-$

benzoquinon-2-ylmethyl)phenyl]butanoyl]piperidine,

N-[4-[3-(5,6-dimethox]-3-methyl-1,4-

benzoquinon-2-ylmethyl)phenyl]butanoyl]thiomorpholine,

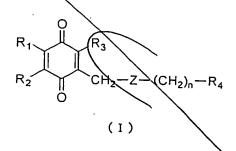
N-[4-[3-(5,6-dimethoxy-3]-methyl-1,4-

benzoquinon-2-ylmethyl)phenyl]butanoyl]morpholine, and N-[4-[3-(5,6-dimethoxy-3-methyl-1,4-

benzoquinon-2-ylmethyl)phenyl]butanoyl]isopropylamine.

16. An inhibitor of TNF-α production comprising as an active ingredient a benzoquinone derivative

30 represented by the following general formula (1):



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wherein

 R_1 , R_2 , and R_3 are each independently a hydrogen atom, an alkyl group having 1 to 5 carbons, or an alkoxy group having 1 to 5 carbons;

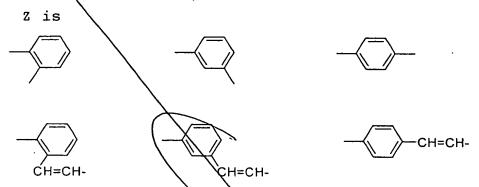
R₄ is a hydrogen atom, a hydroxymethyl group, an alkyl group, or a carboxyl group which is optionally esterified or amidated;

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and, n is an integer from 0 to 6,
or its hydroquinone form, or a pharmaceutically
acceptable salt thereof.

17. The inhibitor of TNF-α production according to wherein claim 16 in which R₁ and R₂ are a hydrogen atom, a methyl group, or a methoxy group.

18. The inhibitor of TNF- α production according to wherein which R_3 is a hydrogen atom or a methyl group.

19. The inhibitor of TNF-α production according to wherein claim 16, 17, or 18 in which Z is

30 and n is an integer 0. inhibitor composition

20. The inhibitor of TNF- α production according to wherein claim 16, 17, or 18 in which Z is

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and n is an integer 1, 2, or 3. Inhibitor Composition 21. The inhibitor of TNF-α production according to wherein claims 16 to 20 in which R₄ is a group -COOR₅ wherein R₅ is a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted aralkyl group having 7 to 11 carbons. Composition to inhibitor Composition

22. The inhibitor of TNF- α production according to wherein any one of claims 16 to 20 in which R_4 is a group -CONR₆R₇ wherein R₆ and R₇ are each independently a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted bicyclic unsaturated or partially saturated hydrocarbon ring group having 9 to 11 carbons, an optionally substituted heterocyclic group, an optionally substituted phenyl group, an optionally substituted aralkyl group having 7 to 11 carbons, or a heteroaryl-C₁-C₃-alkyl group, or R₆ and R₇, together with the nitrogen atom to which they are attached, represent a heterocyclic group which may further contain a nitrogen, oxygen, and/or sulfur atom.

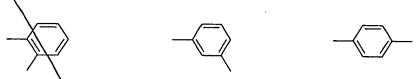
23. The inhibitor of TNF- α production according to wherein any one of claims 16 to 20 in which R_4 is a group -CONR₆R₇, wherein R_6 and R_7 , together with the nitrogen atom to which they are attached, represent a 5- to 10-membered optionally substituted, nitrogen-containing heterocyclic group which may contain, in addition to the carbon and nitrogen atom, 1 to 3 heteroatoms selected from the group consisting of a nitrogen, oxygen and sulfur atom, the carbon atom on said cyclic group being optionally a ketone form or the sulfur atom on said cyclic group being optionally an oxide form.

24. The inhibitor of TNF-α production according to

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wherein claim $16 = \frac{21}{21}$, 22, or 23 in which R_1 and R_2 are a methyl group or a methoxy group; R_3 is a methyl group: R_4 is a carboxyl group which is optionally esterified or amidated; Z is

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and n is an integer 1, 2, or 3.

25. The inhibitor of TNF-α production according to wherein the any one of claims 16 to 24 which is a suppressing agent for the gene expression of one or more substances is selected from the group consisting of IL-1, TNF-α, IL-2, IL-6, IL-8, iNOS, granulocyte colony-stimulating factor, interferon-β, ICAM-1, VCAM-1, ELAM-1, plasminogen activator-inhibiting factor I, major histocompatibility system class II,

26. The inhibitor of TWF-α production according to any one of claims 16 to 24 which is a preventive or therapeutic agent for inflammatory diseases.

amyloid A, angiotensinogen, complement B, complement C4,

β2-microglobulin, immunoglobulin light chain, serum

c-myc, HIV, HTLV-1, SV40, QMV, and adenovirus.

- 27. The inhibitor of TNF-a production according to any one of claims 16 to 24 which is a preventive or therapeutic agent for autoimmune diseases.
- 28. The inhibitor of TNF-α production according to any one of claims 16 to 24 which is a preventive or therapeutic agent for viral diseases.
- 29. A preventive or therapeutic agent for diseases caused by the excessive production of TNF- α comprising as an active ingredient a benzoquinone derivative represented by the following general formula (1):

$$R_1 \longrightarrow R_3$$

$$R_2 \longrightarrow CH_2-Z-(CH_2)_n-R_3$$

$$(I)$$

wherein

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 R_1 , R_2 , and R_3 are each independently a hydrogen atom, an alkyl group having 1 to 5 carbons, or an alkoxy group having 1 to 5 carbons;

R₄ is a hydrogen atom, a hydroxymethyl group, an alkyl group, or a carboxyl group which is optionally esterified or amidated;

and, n is an integer from 0 to 6, or its hydroquinone form, or a pharmaceutically acceptable salt thereof.

30. A benzoquinone derivative represented by the following general formula (1):

$$R_1$$
 R_2
 $CH_2-Z-(CH_2)_0-R_4$
 (I)

30

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wherein

 R_1 , R_2 , and R_3 are each independently a hydrogen atom, an alkyl group having 1 to 5 carbons, or an alkoxy group having 1 to 5 carbons;

 R_4 is a hydrogen atom, a hydroxymethyl group, an alkyl group, or a carboxyl group which is optionally

esterified or amidated;

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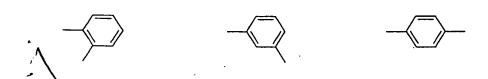
and, n is an integer from 0 to 6, provided that when Z is

CH=CH-

n is not 0, and when Z is

n is neither 0 nor 2, or its hydroquinone form or a pharmaceutically acceptable salt thereof.

- 31. The benzoquinone derivative according to claim wherein 30 in which R_1 and R_2 are a hydrogen atom, a methyl group, or a methoxy group, or its hydroquinone form or a pharmaceutically acceptable salt thereof.
- 32. The benzoquinone derivative according to claim wherein 30 or 31 in which R₃ is a hydrogen atom or a methyl group, or its hydroquinone form or a pharmaceutically acceptable salt thereof.
- 33. The benzoquinone derivative according to claim whenein 30, 31, or 32 in which Z is



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and n is an integer 1 or 3, or its hydroquinone form or a pharmaceutically acceptable salt thereof.

- 34. The benzoquinone derivative according to any wherein $30 \text{ to } 33 \text{ in which } R_4$ is a group $-\text{COOR}_5$ wherein R_5 is a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted phenyl group, or an optionally substituted aralkyl group having 7 to 11 carbons, or its hydroquinone form or a pharmaceutically acceptable salt thereof.
- 35. The benzoquinone derivative according to any wherein and $30 \text{ to } 31 \text{ in which } R_4$ is a group $-\text{CONR}_6R_7$ wherein R_6 and R_7 are each independently a hydrogen atom, an optionally substituted alkyl group having 1 to 8 carbons, an optionally substituted bicyclic unsaturated or partially saturated hydrocarbon ring group having 9 to 11 carbons, an optionally substituted heterocyclic group, an optionally substituted phenyl group, an optionally substituted aralkyl group having 7 to 11 carbons, or a heteroaryl- C_1 - C_3 -alkyl group, or R_6 and R_7 , together with the nitrogen atom to which they are attached, represent a heterocyclic group which may further contain a nitrogen, oxygen and/or sulfur atom, or its hydroquinone form or a pharmaceutically acceptable salt thereof.
- 36. The benzoquinone derivative according to any ene of claims 30 to 33 in which R_4 is a group $-\text{CONR}_6R_7$ wherein R_6 and R_7 , together with the nitrogen atom to which they are attached, represent a 5- to 10-membered optionally substituted, nitrogen-containing heterocyclic group which may contain, in addition to the carbon and nitrogen atom, 1 to 3 heteroatoms selected from the group consisting of a nitrogen, oxygen and sulfur atom, the carbon atom on said cyclic group being optionally a ketone form or the sulfur atom on said cyclic group being

37. The benzoquinone derivative according to claim $30 \times \frac{34}{35}$, or 36 in which R_1 and R_2 are a methyl group or a methoxy group; R_3 is a methyl group: R_4 is a carboxyl group which is optionally esterified or amidated; Z is

and n is an integer 1 or 3, or its hydroquinone form or a pharmaceutically acceptable salt thereof.

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